ICM 2024

Program

Welcome Message

From the conference Honorary Chair

Name:

Welcome Message

From the conference Chairs

Dear Authors,

On behalf of the Conference Organizing Committee, it gives us a great pleasure to welcome you to the 36th international Conference on Microelectronics (IEEE-ICM2024). As General co-chairs of the Organizing Committee, we are honored to welcome you at this 26th edition. The conference is hosted by Hamad Bin Khalifa University (HBKU), Doha, Qatar, and technically co-sponsored by IEEE CAS R8, IEEE Qatar Section, IEEE CAS Egypt Chapter and IEEE Lebanon Joint Chapter (CAS, PES, IE, PEL) on December 14-17, 2024. IEEE-ICM2024 is an international conference that provides a forum for engineers, scientists, and researchers to present their state-of-the-art findings in microelectronics and its numerous applications. The main theme of the conference this year is "Microelectronic Circuits and Systems for Artificial Intelligence (AI)".

The conference represents a golden opportunity for participants to interact in a scientific platform and share experiences in related industry and technology applications. Moreover, we are proud to have five distinguished keynote speakers from industry and academic institutions: 1-Dr. Pradeep Elamanchili (Vice President - ASIC Development Engineering, Western Digital), 2- Dr. Achim Strass (Head of Technology Scouting and Cooperation, Munich, Germany), 3- Dr. Mihai Sanduleanu (Khalifa University, UAE), 4- Dr. Kea-Tiong (Samuel) Tang (National Tsing Hua University) and 5- Dr. Khaled Salama (KAUST, KSA).

In addition, we are proud to have five tutorials from academic institutions: 1- Dr. Mounir Boukadoum (Canada), 2- Dr. Moustafa Nawito (Germany), 3- Dr. Hanjun Jiang (China), 4- Dr. Baker Mohammad (UAE), and 5- Dr. Yuanjin Zheng (China).

IEEE-ICM2024 has received 178 regular 4-7 pages IEEE format, covering the various aspects of sciences and engineering. Each paper was assessed by at least THREE reviewers. Out of all submissions, 86 papers were accepted and are included in the conference program. All presented papers will be submitted for publication to the IEEE Xplore® digital library and will be indexed in Scopus. We would like to thank Hama Bin Khalifa University for hosting this 26th edition of ICM, Invest Qatar and Qatar Free Zone Authority for their generous sponsorship and IEEE for their support in organizing and sponsoring this conference. Moreover, a word of thanks is extended to the main conference supporters and sponsors: HBKU, Invest Qatar, Qatar Free Zone Authority, IEEE, IEEE CAS R8, IEEE Qatar Section and IEEE Lebanon Joint Chapter PES/CAS/PEL/IE, IEEE CAS Egypt Chapter.

Finally, we would like to express our profound appreciation to all members of the organizing committee for their valuable efforts in making IEEE-ICM2024 a successful event. Thanks are due to the advisory committee, scientific committee, expert reviewers, session chairs, authors and IT technician. We would also like to thank the conference participants for their contributions, for their support, and their attendance. We wish you all a successful and a productive conference, and we look forward to seeing you and welcoming you all in Doha, Qatar. We will do our very best to make this edition of ICM a memorable experience.

Conference co-Chairs

Prof. Amine Bermak

Prof. Mohamad Sawan

Keynote Speakers

DR. ACHIM STRASS

HEAD OF TECHNOLOGY SCOUTING AND COOPERATION IN NEXPERIA, MUNICH, GERMANY

Title: Revolutionizing Traction Inverters: Advances in High-Power Module Packaging for Electric Vehicles

Abstract: Power modules are pivotal in electric vehicles, where packaging impacts performance, reliability, and lifespan. Wide bandgap (WBG) semiconductors like Silicon Carbide (SiC) and Gallium Nitride (GaN) enable higher temperatures, frequencies, and efficiencies compared to silicon. Recent innovations, including molded modules and double-sided cooling, enhance flexibility and thermal performance. Robust topside interconnections and advanced die-attach technologies like copper sintering address the increasingly challenging high-power demands. Embedding semiconductor devices into printed circuit boards (PCBs) reduces size and improves efficiency by minimizing resistance and inductance.

Biography: Dr. Achim Strass received his Diploma in Physics from the Technical University of Munich in 1994 and earned his PhD (Dr.-Ing.) in Silicon Process Technology from the Bundeswehr University Munich in 1998. He began his career at Siemens (now Infineon Technologies), where he successfully led several global semiconductor equipment and software harmonization projects.

In 2004, Dr. Strass played a key role in establishing Qimonda's assembly and test operations in Suzhou, China, setting up both, failure analysis and yield management capabilities. Returning to Germany, he pioneered the industry's first replacement of gold with copper wire in high-integration, low-power automotive packages as an overall project leader. Dr. Strass then returned to Asia to found the High-Power Center Automotive at Infineon Korea, where he earned the prestigious High-Performance Award for securing a significant customer project with his team, focused on vehicle electrification with innovative high-power modules that were new to the industry.

In 2017, he joined Huawei in the greater Munich area as a Technical Director, tasked with building a large-scale, modern manufacturing technology center from scratch. He was responsible for the whole R&D dedicated a.o. to advancing new high-power electronics technologies. A short time later, he was appointed Director of the Advanced Power Electronics Technical Management Group at the corporate level. Since 2022, Dr. Strass has served as the head of worldwide technology scouting and cooperation at Nexperia, leveraging his extensive network to connect this young company with global semiconductor ecosystems. He is a member of Nexperia's R&D Leadership Team and contributes to several internal and external top management boards.

DR. MIHAI SANDULEANU

ASSOCIATE PROFESSOR AT KHALIFA UNIVERSITY OF SCIENCE AND TECHNOLOGY

Title: Medical devices at mm-Waves: Vital Signs Monitoring and Non-Invasive Glucometer. Past, present and future

Abstract: The talk concerns medical devices like Vital Signs Monitoring and Glucometers. After a short presentation of the past and present methods (wired or invasive) we will discuss future solutions that are wireless and non-invasive. The advantage of seeking future solutions at mm and sub-mm Waves is manifold. First, the available bandwidth is higher at those frequencies, and we can get a better range resolution and velocity resolution for Vital signs monitoring. This then allows us to get heart signal with clear P, Q, R, S, T waves and ECG resolution. By this we could replace the 12 wire existing solutions with a wireless ECG. Moreover, at mm-Waves frequencies we could integrate the antennas on chip eliminating bond-wire connections to the antennas. For non-invasive glucose level detection, going to mm-Wave frequencies allows a compact solution with small footprint.

Biography: Received his MSc, MEE and PhD degrees from the Technical University of Iasi, Romania, Eindhoven University of Technology, The Netherlands and University of Twente, The Netherlands in 1990, 1993 and 1999, respectively. From 1999 to 2000, he was with Philips Semiconductors, Nijmegen, The Netherlands, working on fiber optic communication circuits. From 2000 to 2007 he joined Philips Research Eindhoven, The Netherlands and he was involved in Fiber Optic Interface circuits, RF IC Design, mm-Waves Transceiver design and Ultra-low-power radios. From 2008 to 2013, he conducted research at IBM T.J. Watson Research Center, Yorktown Heights, New York in mm-Waves transceivers for communication, imaging and RADAR, THz electronics. He is currently Associate Professor at Khalifa University of Science and Technology. Dr. Sanduleanu's area of expertise include Wireless transceiver design for RF/mm-Waves/THz communication, High Speed Communication Circuits for serial I/O, High speed analog-to-digital converters, Phased-Array Systems, High-speed digital circuits and systems. Dr. Sanduleanu authored/co-authored 8 books and more than 120 papers in International Conferences and Journals. He holds 54 US patents. Dr. Sanduleanu served as Associate Editor for IEEE Transactions on Circuits and Systems in 2011-2012.

DR. KHALED NABIL SALAMA

PROFESSOR OF ELECTRICAL AND COMPUTER ENGINEERING.

Title: Advancing Monitoring Capabilities: The Role of Wearable Sensors in Advancing Healthcare, Environmental, and Marine Studies

Abstract: This seminar examines the transformative impact of wearable sensor technologies across healthcare, environmental monitoring, and marine biology. In healthcare, these sensors enable continuous monitoring for enhanced patient care and disease management. Environmental applications range from real-time pollution monitoring to ecosystem management, while in marine biology, wearable sensors facilitate non-invasive studies of aquatic life. The discussion will highlight technological advancements in sensor miniaturization and energy efficiency, emphasizing the critical role of interdisciplinary collaboration in optimizing wearable technologies for diverse applications.

Biography: Professor Khaled Nabil Salama serves as a professor of electrical and computer engineering. He earned his bachelor's degree with honors from Cairo University in 1997 and later completed his master's and doctoral degrees at Stanford University in 2000 and 2005, respectively. His early academic career included a position as an assistant professor at Rensselaer Polytechnic Institute before joining KAUST in 2009, where he was the founding program chair for Electrical Engineering until 2011. He was the director of KAUST sensors initiative between 2016-2021. Professor Salama's research is highly interdisciplinary, focusing on the development of devices, circuits, systems, and algorithms to facilitate inexpensive analytical platforms for industrial, environmental, and biomedical applications. He has made significant contributions to the field of low-power mixed-signal circuits for intelligent sensors and integrated biosensors. His work also extends into VLSI architectures for bio-imaging and instrumentation. More recently, he has been involved in pioneering neuromorphic circuits aimed at emulating brain functions. His scholarly output includes over 400 papers and 48 patents.

DR. PRADEEP ELAMANCHILI

VICE PRESIDENT, HEAD OF GLOBAL CUSTOM SILICON/ASIC R&D, WESTERN DIGITAL

Title: Generational Transformations in VLSI Engineering!...

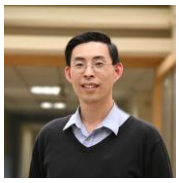
Abstract: In the context of other major transformation in the world and in Semiconductor industry, we share our vision of how the Generative-AI will transform the VLSI design process of tomorrow and speed up significantly with GenAI ‘co-designers'. The talk will cover some of the technologies that Western Digital has implemented internally for autonomous design implementation and how Western Digital leverages the latest in 3D silicon ("skyscrapers") technology for flash storage to prepare us for the Zettabyte storage era starting in 2024.

Biography: Pradeep Elamanchili is a seasoned semiconductor technology executive with over two decades of experience driving innovation in the semiconductor and systems industries. Having held key leadership roles at top companies like Intel, AMD, SanDisk, and Western Digital, he has led multi-billion-dollar transformations and product developments. As the head of Global Custom Silicon/ASIC R&D at Western Digital, Pradeep oversees the company's end-to-end custom silicon architecture, technology, and ASIC/SOC development, and productization serving all business segments and shipping hundreds of millions of products annually.

In addition to his deep expertise in silicon engineering, Pradeep has been at the forefront of integrating AI advancements into semiconductor design, implementing advanced machine learning-driven platforms to optimize silicon development. These innovations have significantly enhanced design efficiency, reduced costs, and accelerated product development across consumer, mobile, and data center markets.

Pradeep has led major advancements in CPU, SOC, and GPU technologies, including pioneering many firsts in the semiconductor industry, setting new benchmarks in performance, efficiency, and innovation. His work spans global markets and partnerships, driving growth through strategic planning, engineering execution, and organizational leadership.

Pradeep is based in California. He is also a technology advisor and board member, committed to advancing STEM education for underprivileged children.



DR. KEA-TIONG (SAMUEL) TANG

PROFESSOR, NATIONAL TSING HUA UNIVERSITY, HSINCHU, TAIWAN

Title: Neuromorphic Techniques for an Intelligent Vision System

Abstract: Massive computation, data, and power consumption limits the deployment of artificial intelligence on edge devices. Key technologies based on neuromorphic computing provide solutions to edge computing, which is essential to develop the next generation AI chip. In this talk, neuromorphic techniques including model, architecture, and sensing will be discussed. These techniques will be demonstrated on a microdrone platform for the task of obstacle avoidance.

Biography: Dr. Kea-Tiong (Samuel) Tang received the B.S. degree in electrical engineering from National Taiwan University, Taiwan in 1996, and received the M.S. and Ph.D. degrees in electrical engineering from California Institute of Technology, Pasadena, CA, USA, in 1998 and 2001, respectively. During 2001–-2006, Dr. Tang was a Senior Electrical Engineer with Second Sight Medical Products, Inc., Sylmar, CA, USA. He designed mixed signal ASIC for the ArgusÒ II Retinal Prosthesis System, which became the first FDA approved device for retinal prosthesis. Since 2006, he joined the Electrical Engineering Faculty at National Tsing Hua University, Hsinchu, Taiwan, and is currently a full Professor. His research interests include bio-inspired learning chip, miniature electronic system, and biomedical implantable prosthetic device.

He has actively collaborated with researchers in Nanoengineering and Microsystems, Chemistry, Computer Science, Electrical Engineering, Life Science, and Medical doctors, and has published more than 250 peer-reviewed journal and conference papers in these research areas. He has led the largest electronic nose team in Taiwan to develop a system that can early detect and rapid diagnose ventilator-associated pneumonia. He is a recipient of numerous awards, including Outstanding Young Scholar Award, Wu Ta-You Memorial Award, National Innovation Award, and Outstanding Electrical Engineering Professor Award.

Dr. Tang is a senior member of IEEE. He is member of IEEE SSCS, CASS, EDS, and EMBS. He was the Past Chair of IEEE Biomedical and Life Science Circuits Systems Technical Committee (BioCAS). He was the Editor-in-Chief of IEEE Transactions on Biomedical Circuits and Systems (TBioCAS) (2022-2023). He has served as TPC member of ISSCC, IEDM, ASSCC, ISCAS, and BioCAS. He was IEEE CAS Chapter Chair of Taipei Section (2017-2018). He was the Chair of IEEE Taipei Section (2021-2022). He was a Board of Governor (BoG) of CAS Society, serving as Representative of Region 10 (2020~2021). He is the current Vice President – Regional Activities and Membership of IEEE CASS.

Tutorials

PROF. MOUNIR BOUKADOUM

PROFESSOR, UNIVERSITY OF QUEBEC AT MONTREAL

Title: Artificial intelligence for wearable devices: a case study using a myoelectric hand prosthesis control interface

Abstract: Nature inspired computation using neural networks has given rise to new problem-solving approaches using examples instead of formal reasoning. In particular, the deep learning paradigm can lead to efficient solutions of complex classification and prediction problems when large numbers of training examples are available. On the other hand, there exist also design problems, which are typically undetermined and for which the training data are limited. The tutorial explores these challenges, both in software and hardware, when applying AI to wearable devices. Using the example of a surface electromyography-driven hand prosthesis control system, the sensing, signal processing, and machine learning pipelines of a full wearable system are detailed.

Biography: Mounir Boukadoum is professor of microelectronics engineering at The University of Quebec at Montreal (UQAM), Canada. He received the PhD degree in Electrical Engineering from the University of Houston, Texas, USA. He has a background in both physics and electrical engineering, with an emphasis on biomedical applications, and his current research covers the applications of artificial intelligence and nature-inspired techniques to analysis and design problems, particularly in relation to biomedical outcomes. Pr. Boukadoum has held managerial positions at all academic cycles and is currently the executive director of the Quebec Strategic Alliance for microsystems (ReSMiQ), a research consortium of 10 Quebec universities and engineering schools. He is a cofounder of the NEWCAS conference, now a regional flagship conference of the IEEE CAS Society. Pr. Boukadoum has been an active member of IEEE for over 25 years, with involvement in the organization of several major IEEE conferences. He is a member of the IEEE NEWCAS, ICECS, LASCAS and ICM conferences' steering committees, and of the IEEE Neural Systems and Applications technical committee (NSA-TC). He has published over 250 refereed journal and conference papers and has received both the outstanding teaching career award and the outstanding research career award from UQAM

PROF. BAKER MOHAMMAD

PROFESSOR, KHALIFA UNIVERSITY

Title: Intelligent Memory for Efficient AI Hardware Accelerator

Abstract: Memory architecture and design have been critical for digital systems to achieve ample storage, low latency, fast access time, and energy efficiency, especially for battery-operated devices. The increase of data generated by many devices such as mobile phones, sensors, communications, and security increased the requirements for memory capacity and the challenges of memory access and energy. The memory interface has limited throughput and high latency, which has not been scaling at the same rate as data size or processing speed; this limits the performance of accessing the data, which is referred to as the memory wall. In addition to the negative impact on latency and performance, large data movement results in high energy consumption. Research has focused on elevating the memory wall issue by engineering more memory hierarchy and increasing local on-chip memory. This has partially reduced the timing issue but did not address the high leakage and active energy consumption. It is estimated that over 60% of energy spent on most computing platforms is spent on data movements and memory access.

The new era of big data and artificial intelligence-based applications has increased the urgency to solve memory capacity, data movement energy, and memory wall issues. Some solutions have brought processing into centralized cloud computing, with high performance and large memory hardware capacity available. However, this brought a new challenge to communications, privacy, security, and latency, especially for real-time applications. This tutorial highlights the challenges above and presents a new computing paradigm beyond von Neuman's architecture to enable processing as close to the data source as possible. This includes in-memory computing and near-memory computing architecture. Both existing and emerging memory technologies will be explored. Since the new computing paradigm is more data-centric than processing-centric, the traditional single architecture for all applications is not feasible. Hence, domain-specific architecture and hardware solutions need to be adopted. Popular high computing functions such as Query, MAC, hamming distance, and image compression will be presented as examples of in-memory hardware accelerators.

Biography: Dr. Baker Mohammad is the director of the System on Chip lab and professor of CIE at Khalifa University. Dr. Baker is a senior member of IEEE and an IEEE CAS Society distinguished lecturer (2023-2024). Before joining Khalifa University, he was a Senior Staff Engineer/Manager at Qualcomm, Austin, TX, USA, for 6-years, where he was engaged in designing high-performance and low-power DSP processors used for communication and multimedia applications. Before joining Qualcomm, he worked for ten years at Intel Corporation on a wide range of microprocessor designs from high-performance server chips > 100Watt (IA-64) to mobile embedded processors low power sub 1 watt (xscale). Baker earned his PhD from the University of Texas at Austin in 2008, his M.S. degree from Arizona State University, Tempe, and his BS degree from the University of New Mexico, Albuquerque, all in ECE. His research interests include VLSI, power-efficient computing, embedded memory and in-memory computing, neuromorphic computing, emerging technology such as Memristor, STTRAM, hardware accelerators for Cyber-Physical Systems and AI.

Baker authored/co-authored over 200 referred journals and conference proceedings, >5 books, >20 US patents, multiple invited seminars/panellists, and the presenter of >3 conference tutorials, including one tutorial on Energy Harvesting and Power Management for WSN at the 2015 (ISCAS). Baker is on the advisory board for the secure systems research center part of the Technology Innovation Institute. Baker is an associate editor for IEEE Transaction on VLSI (TVLSI), IEEE Access, and Scientific Reports journals. Dr Mohammad participates in technical committees at IEEE conferences and reviews for TVLSI, IEEE Circuits and Systems journals. He has received several awards, including the KUSTAR staff excellence award in intellectual property creation, IEEE TVLSI best paper award, 2016 IEEE MWSCAS Myrill B. Reed best paper award, and Qualcomm Qstar award for excellence in performance and leadership. SRC Techon's best session papers for 2016 and 2017 on the community.

DR. HANJUN JIANG

PROFESSOR, TSINGHUA UNIVERSITY

Title: Energy-Efficient ASIC Techniques for Implantable Sensing

Abstract: Implantable sensing is a promising solution to provide continuous monitoring of human body with a bunch of merits, such as direct measurement of vital signals, improved system robustness, anti-interference capability, etc. The highly-integrated and energy-efficient application specific integrated circuits (ASICs) are the key building components to build the miniature implantable sensors. Such ASICs will provide the functions of signal acquisition, processing and transmission. In this tutorial, we will first review the signal acquisition/processing/transmission requirements in such applications, foll0wed by the major considerations of these ASICs. We will then take two practical applications as the examples, namely, the implantable electrocardiogram (ECG) sensor and the intracranial pressure (ICP) sensor, to exhibit the state-of-the-arts ASIC techniques for ultra-low power bio-signal acquisition, near sensor processing, and short-range through-body data transmission. The design principles of energy-efficient ASICs will be illustrated through these two design examples. The technique trends in this specific area will also be briefly discussed in this tutorial.

Biography: Hanjun Jiang received the B.S. degree in electronic engineering from Tsinghua University, Beijing, China, in 2001, and the Ph.D. degree in electrical engineering from Iowa State University, Ames, IA, USA, in 2005. From 2005 to 2006, he was with Texas Instruments, Dallas, USA. He has been with the School of Integrated Circuits (formerly the Institute of Microelectronics), Tsinghua University since 2007, where he is currently a full professor and the vice dean. His current research interest mainly focuses in the area of energy-efficient circuits and systems design, including the signal acquisition circuit, short-range transceiver and system-level integration, with an emphasis on the medical and healthcare applications. He has authored and co-authored over 160 peer-reviewed journal and conference papers, and contributed to 3 books. He holds more than 40 patents. He is an IEEE CASS Distinguished Lecturer (2024-2025 term), and an associate editor of IEEE Transactions on Biomedical Circuits and System (TBioCAS), Microelectronics (in Chinese), and Integrated Circuits and Embedded Systems (in Chinese). He was the IEEE Solid-State Circuits Society Beijing Chapter Chair from 2015 to 2018, and an associate editor of IEEE Transactions on Circuits and Systems II: Express Briefs (TCAS-II) (2022-2023).

DR. ZHENG YUANJIN

PROFESSOR, NANYANG TECHNOLOGICAL UNIVERSITY

Title: Emerging Electromagnetic Acoustic Sensing and Imaging beyond Radar and Ultrasound Systems

Abstract: Emerging Electromagnetic Acoustic technique is to combine the merits of traditional electromagnetic sensing technique (e.g. Radar and Lidar) with acoustic imaging (e.g. microphone and ultrasound), and go beyond. In this seminar, we would introduce three topics: (1) Low power phase arrayed Radar chip for SAR imaging, (2) Photoacoustics sensing and imaging system, (3) Thermoacoustics sensing system. On the phase array radar transceiver, the design challenge is to generate and transmit multiphased wideband chirp signal and to do stretch processing based high resolution beamforming. The detailed circuits and system to implement the radar sensor will be presented. Photoacoutics sensor transmit focused laser light deep penetrated to the tissue/blood vessel, inducing high frequency ultrasound signal, and then high resolution acoustic imaging can be formed. To miniaturize the whole sensor and achieve high sensitivity, the fibre coupled pulsed laser, beamforming ultrasound transducer, and low power low noise signal acquisition circuits are designed and implemented. Furthermore, there appears increasing interests to use microwave induced thermoacoustic and/or mageneto-acosutic signal for NDT applications. We will brief introduced some coil based EM transmitter for wireless power transfer, and EMAT based non-contact sensing.

Biography: Dr. ZHENG Yuanjin received his B.Eng. from Xian Jiaotong University, P. R. China in 1993, M. Eng. from Xian Jiaotong University, P. R. China in 1996, and Ph.D. from Nanyang Technological University, Singapore in 2001. From July 1996 to April 1998, he worked at the national key lab of optical communication technology, university of electronic science and technology of China. He joined Institute of Microelectronics, A*STAR on 2001 and developed as a Group Technical Manager. Since then, he has leaded in developing various wireless systems and CMOS Integrated Circuits, such as Bluetooth, WLAN, WCDMA, UWB, RF SAW/MEMS Radar, wireless capsule imager etc. Since July 2009, he joined Nanyang Technological University, now a full professor, and as Director for Center of Integrated Circuits and Systems, and Director, Schaeffler-NTU Joint Lab working on various Sensor Systems. He has published over 500 papers, 5 book chapters and filed 30 patents, He has been granted total $45M to work on various R&D projects, including dozens of industrial projects. He serves as associate editor of IEEE transactions on Circuits and systems-I, IEEE Trans. on Biomedical Circuit and Systems, and IEEE Journal of Electromagnetics, RF and Microwave in Medicine and Biology. He is a senior member of IEEE, SPIE and OSA.

PROF. MOUSTAFA NAWITO

DEAN OF IT & ENGINEERING FACULTY AND CHAIR OF ELECTRICAL ENGINEERING AT IU INTERNATIONAL UNIVERSITY OF APPLIEDSCIENCES – GERMANY

Title: On-Chip Electrochemical Impedance Spectroscopy: theory, design, implementation and application

Abstract: Electrochemical Impedance Spectroscopy (EIS) is one of the most important techniques employed in electrochemical analysis. It finds applications in a wide range of fields such as corrosion detection, biomedical sensors, battery and fuel cell development, surface characterization and physical electrochemistry, to name a few. The mean reason for its widespread adoption is that fact that it provides more information content than any other electrochemical techniques. Fully integrated on-chip EIS systems have contributed to the popularity of this technique and opened the door for new use cases. Portable and fully implantable biomedical devices for biomarker monitoring, smart Battery Management Systems (BMS) with Cell Monitoring Circuits (CMCs), distributed gas sensors and sensor array microsystems are some of the applications scenarios that rely on on-chip EIS.

Biography: Dr Moustafa Nawito was born in 1979 in Cairo Egypt. He attained his B.Sc. in Electronics and Electrical Communication Engineering from the faculty of engineering at Cairo University in 2002 and his M.Sc. in RF Electronics from the German university in Cairo in 2007. In 2017 he attained his Dr.-Ing. (Magna cum laude) in Microelectronics from Stuttgart University in Germany.

In 2008 he was appointed as technical manager of the research center for digital broadcasting at GUC in cooperation with Fraunhofer Institute IIS in Erlangen Germany. During this time, he conducted several seminars and workshops on advanced ASIC design for industrial and academic partners. He also cofounded the “Center for Artificial Intelligence” and led a research team to win the international RoboCup scientific competition in 2009. He was also a co-founder of the Egyptian IEEE chapter for computational intelligence which received the best chapter award in 2009.

In 2010 he joined the Institut für Mikroelektronik Stuttgart IMS CHIPS as a senior ASIC designer, where he was responsible for the development of novel circuits for camera systems, industrial sensors and biomedical intelligent implants for diagnosis and therapy for Bosch, Daimler, and other industrial clients. In addition, he was the scientific project director of various German and international research projects.

In 2017 he founded the startup company Polymath Analog where he works in close cooperation with customers to provide innovative and reliable ASIC solutions for Internet of Things, Industry 4.0 and automotive applications, with special emphasis on advanced analog design. He served as lead consultant for the development of a new generation of implantable image sensors for the company Retina Implant AG.

In 2020 he joined the IU International University of Applied Sciences as a professor and founding chair of the electrical engineering program. He successfully led the development of the curriculum and the academic accreditation of the newly established department. He also serves as scientific reviewer on several committees for the appointment of new Professors.

Prof. Nawito is the author of several publications, including the textbook "CMOS Readout Chips for Implantable Multimodal Smart Biosensors (Springer)". His research interests include the design of low power data converters, high precision sensors and organic and implantable electronics. He is a senior member of IEEE, VDE, OE-A and other technical societies and associations. In addition, he is an expert reviewer for the accreditation of engineering university programs for the EU and has conducted on-site reviews in 4 continents.

DR. SHERIF SALEH
ELMOS SEMICONDUCTOR
GERMANY

DR. HATTAN ABUTARBOUSH

Title: Smart Sensors for Automotive Applications

Abstract: Recently, the principle of intelligent sensors has become increasingly popular in the automotive market. Car sensors play a crucial role in ensuring that a vehicle operates safely and efficiently. The time now to take advantage of bus communication, digital signal processing and fault diagnosis. ASIC permits the level of integration needed to control the production costs while allowing libraries of component to be assembled cheaply and easily on a workstation to provide the required flexibility.
Sensors are now an essential part of any modern automotive design and serve many different purposes. They play a key role in helping car manufacturers to bring models to the market that are safer, more economical and more comfortable-to-drive. Over time, sensors will also enable greater degrees of vehicle automation, which is benefit to the industry. The next-generation sensors being developed will ultimately determine the desired autonomous driving experience. Through innovating in the areas mentioned in this insight, the cars of tomorrow will provide a clear and constantly updated picture of what is happening, both in relation to the external environment and in relation to what their occupants are doing. Therefore, sensing technologies hold key to the future of the automotive industry.
This tutorial will throw light on different types of sensors in a car, which monitor different aspects of a vehicle and send information to the ECU. With the focusing on their functions and their implementation in the system.

Biography: Dr Sherif Saleh was born in Cairo, Egypt, in 1976. He received his BSc and the MSc. in Electrical Engineering, with emphasis on Electronics and Communications in 1999 and 2002, with honor degree, and the Dr.-Eng. degree from the IMTEK, Freiburg, Germany, in 2012, with highest honors.
In 2000, he joined the Electronics Research Institute, ERI, Cairo, Egypt, where he was working as a research assistant in the field of low power analog circuit designs. From 2002-2003, he has been with the company of Mettler-Toledo, Zürich, Switzerland, where he has working in the field of VLSI. From 2003-2004, he was as a system and analog designer by the company of MEMS-Cap in Cairo, Egypt, where he was working in the field of analog circuits for low-voltage, low-power- RF applications. At the end of 2004, he moved to the center of electronics engineering research Institute, CEERI, Pilani, India, where he was working in the field of Microsensors. In 2005, he moved to the Institute of Microsystem Technology, IMTEK, Albert-Ludwigs-University, as a senior analog designer, and for working toward the Ph.D. degree in the field of RF wireless receivers for medical implantable communication systems.
From March 2012 until Mai 2014, he was a Posdoc at the chair of microelectronics, IMTEK at the University of Freiburg. In the period from June 2014 until August 2017, Dr. Saleh joined the ATLAS- detector (CERN-Switzerland) team, as a technical lead. Since September 2017, Dr. Saleh is a senior analog designer in the company of ELMOS Semiconductor, specialized in automotive systems. From 2021-2022, he was working as a consultant in automotive area. Now he is a Technical project manager at the Uni-Freiburg in Germany. Dr. Saleh' main research interests include analog-signal circuit design, RF wireless transceiver circuits for biomedical applications and analog circuit designs for automotive systems.

Biography: Hattan Abutarboush received the B.Sc Honours degree in Electrical Communications and Electronics Engineering from Greenwich University, London, UK, in 2005 and the MSc degree in Mobile Personal and Satellite Communications from the Department of Electrical and Electronics Engineering, Westminster University, London, UK, in 2007. He received the PhD degree from the Department of Electronics and Computer Engineering, in Antennas and Propagation from Brunel University, London, UK, in July 2011.
He was a research visitor to Hong Kong University and National Physical Laboratory (NPL), Teddington, UK in 2010. He was a research fellow at King Abdullah University of Science and Technology (KAUST) from 2011 to 2013. He also worked as a research associate for the American University in Cairo (AUC) from April to July 2011. He was a research assistant in microwave medical imaging at Bristol University, Bristol, UK. Dr. Abutarboush received the Vice-Chancellor's Prize Award for the Best Doctoral Research for 2011 from Brunel University, London, UK and the outstanding achievement Award from the Saudi Arabian Cultural Bureau in London, for the outstanding overall achievement in the PhD degree. He has authored/co-authored over 60 technical papers in international journals and conferences. He also has served as reviewer for different international journals and conferences. Recently he received the top reviewer award (only 10 reviewers in the world) from IEEE Antenna and Propagation society in USA 2013.

Program for *2024 International Conference on Microelectronics (ICM)*

Time (Qatar)	Al Areen 5 & 6	Al Majida	AL Jazi
Saturday, December 14			
12:30 pm-02:30 pm	**Tutorial-1**: *Artificial intelligence for wearable devices: a case study using a myoelectric hand prosthesis control interface* Dr. Mounir Boukadoum	**Tutorial-2**: *On-Chip Electrochemical Impedance Spectroscopy: theory, design, implementation and application* Dr. Moustafa Nawito	**Tutorial-3**: *Energy-Efficient ASIC Techniques for Implantable Sensing -* Dr. Hanjun Jiang
02:30 pm-03:00 pm	**CB1**: *Coffee Break*		
03:00 pm-05:00 pm	**Tutorial-4**: *Intelligent Memory for Efficient AI Hardware Accelerator -* Dr. Baker Mohammad	**Tutorial-5**: *Emerging Electromagnetic Acoustic Sensing and Imaging beyond Radar and Ultrasound Systems* Zheng Yuanjin	**Tutorial-6**: *Smart Sensors for Automotive Applications* Drs. Sherif Saleh & Hattan Abutarbush
05:00 pm-06:30 pm	**Rec [Al Areen (Room 4)]**: *Conference Cocktail Reception*		
Sunday, December 15			
08:00 am-08:30 am	**VIP-Reception [Al Anood Room]**: *Guests' Arrivals and Registration*		
08:30 am-09:00 am	**OpCer [Al Areen (Ballroom)]**: *Opening Ceremony*		
09:00 am-09:40 am	**Panel-1 [Al Areen (Ballroom)]**: *Panel Discussion*		
09:40 am-10:00 am	**CB2**: *Coffee Break*		
10:00 am-11:00 am	**Keynote Speaker-1 [Al Areen (Ballroom)]**: *Generational Transformations in VLSI Engineering!* Dr. Pradeep Elamanchili (Vice President, Head of Global Custom Silicon/ASIC R&D, Western Digital)		
11:00 am-12:20 pm	**s11(A)**: *Biomedical Engineering - Bio-Informatique; Digital Circuits*	**s11(B)**: *Special Session: IoT Hardware Intrinsic Attacks*	
12:20 pm-01:30 pm	**LB1**: *Lunch Break*		
01:30 pm-02:30 pm	**Keynote Speaker-2 [Al Areen (Ballroom)]**: *Advancing Monitoring Capabilities: The Role of Wearable Sensors in Advancing Healthcare, Environmental, and Marine Studies* Dr. Khaled Nabil Salama (Professor of electrical and computer engineering)		
02:30 pm-03:50 pm	**s12(A)**: *Biomedical Engineering - Bio-Informatique; Analogue Circuits*	**s12(B)**: *ANN/AI/ML/DL in Biomedical Engineering - Bio-Informatique*	
03:50 pm-04:30 pm	**CB3**: *Coffee Break*		
04:30 pm-05:50 pm	**S13(A)**: *Hardware Accelerator-Approximate Computing*	**S13(B)**: *Time Efficiency, Process Models, Design optimization*	
Monday, December 16			

Time (Qatar)	Al Areen 5 & 6	Al Majida	AL Jazi
08:30 am-09:30 am	**Keynote Speaker-3 [Al Areen (Ballroom)]**: *Advances in High-Power Module Packaging for Electric Vehicles* Dr. Achim Strass, Nexperia Head of Technology Scouting and Cooperation		
09:30 am-10:50 am	**S21(A)**: *Chaos Theory and Complex Hardware/Software Systems*	**S21(B)**: *ADC-LDO-PLL*	
10:50 am-11:10 am	**CB4**: *Coffee Break*		
11:10 am-12:30 pm	**S22(A)**: *Cyber-physical-Hardware Systems Security*	**S22(B)**: *Analog and RF Circuit Design Techniques-I*	
12:30 pm-01:30 pm	**LB2**: *Lunch Break*		
01:30 pm-02:30 pm	**Keynote Speaker-4 [Al Areen (Ballroom)]**: *Neuromorphic Techniques for an Intelligent Vision System* Dr. Kea-Tiong (Samuel) Tang, Professor, National Tsing Hua University, Hsinchu, Taiwan		
02:30 pm-03:50 pm	**S23(A)**: *AI/IoT/ML/MDL Systems*	**S23(B)**: *Analog and RF Circuit Design Techniques-II*	
03:50 pm-04:30 pm	**CB5**: *Coffee Break*		
04:30 pm-05:50 pm	**S24(A)**: *Digital Systems*	**S24(B)**: *BioSensor, Magnetic, and Smart sensors and sensor networks.*	
07:00 pm-09:00 pm	**Gala**: *Dinner*		
Tuesday, December 17			
08:30 am-09:10 am	**Keynote Speaker-5 [Al Areen (Ballroom)]**: *Mihai Sanduleanu (Associate Professor at Khalifa University of Science and Technology)* Medical devices at mm-Waves: Vital Signs Monitoring and Non-Invasive Glucometer. Past, present and future		
09:10 am-10:30 am	**S31(A)**: *Communication-Antenas Systems*	**S31(B)**: *AI/ML/MDL System*	
10:30 am-11:10 am	**CB6**: *Coffee Break*		
11:10 am-12:30 pm	**S32(A)**: *FPGA Applications*	**S32(B)**: *Semi-Conductor Systems*	
12:30 pm-01:30 pm	**LB-3**: *Lunch Break*		
01:30 pm-02:50 pm	**S33(A)**: *Energy Efficient Computing Based on Emerging Technologies*	**S33(B)**: *Power Systems Technologies and Agriculture*	
02:50 pm-03:59 pm	**S34(A)**: *General circuits-I*	**S34(B)**: *General Circuits-II*	
03:59 pm-04:19 pm	**CB7**: *Coffee Break*		
04:19 pm-04:39 pm	**CC**: *Closing Ceremony*		

Saturday, December 14

Saturday, December 14 12:30 - 2:30 (Asia/Qatar)

Tutorial-1: Artificial intelligence for wearable devices: a case study using a myoelectric hand prosthesis control interface

Dr. Mounir Boukadoum

Tutorial

Room: Al Areen 5 & 6

Chair: Abdallah Kassem

Abstract-Nature inspired computation using neural networks has given rise to new problem-solving approaches using examples instead of formal reasoning. In particular, the deep learning paradigm can lead to efficient solutions of complex classification and prediction problems when large numbers of training examples are available. On the other hand, there exist also design problems, which are typically undetermined and for which the training data are limited. The tutorial explores these challenges, both in software and hardware, when applying AI to wearable devices. Using the example of a surface electromyography-driven hand prosthesis control system, the sensing, signal processing, and machine learning pipelines of a full wearable system are detailed.

Saturday, December 14 12:30 - 2:30 (Asia/Qatar)

Tutorial-2: On-Chip Electrochemical Impedance Spectroscopy: theory, design, implementation and application

Dr. Moustafa Nawito

Tutorial

Room: Al Majida

Chair: Arshad Khan

Abstract: Electrochemical Impedance Spectroscopy (EIS) is one of the most important techniques employed in electrochemical analysis. It finds applications in a wide range of fields such as corrosion detection, biomedical sensors, battery and fuel cell development, surface characterization and physical electrochemistry, to name a few. The mean reason for its widespread adoption is that fact that it provides more information content than any other electrochemical techniques. Fully integrated on-chip EIS systems have contributed to the popularity of this technique and opened the door for new use cases. Portable and fully implantable biomedical devices for biomarker monitoring, smart Battery Management Systems (BMS) with Cell Monitoring Circuits (CMCs), distributed gas sensors and sensor array microsystems are some of the applications scenarios that rely on on-chip EIS.

Saturday, December 14 12:30 - 2:30 (Asia/Qatar)

Tutorial-3: Energy-Efficient ASIC Techniques for Implantable Sensing -

Dr. Hanjun Jiang

Room: AL Jazi

Chair: Bo Wang

Abstract: Implantable sensing is a promising solution to provide continuous monitoring of human body with a bunch of merits, such as direct measurement of vital signals, improved system robustness, anti-interference capability, etc. The highly-integrated and energy-efficient application specific integrated circuits (ASICs) are the key building components to build the miniature implantable sensors. Such ASICs will provide the functions of signal acquisition, processing and transmission. In this tutorial, we will first review the signal acquisition/processing/transmission requirements in such applications, foll0wed by the major considerations of these ASICs. We will then take two practical applications as the examples, namely, the implantable electrocardiogram (ECG) sensor and the intracranial pressure (ICP) sensor, to exhibit the state-of-the-arts ASIC techniques for ultra-low power bio-signal acquisition, near sensor processing, and short-range through-body data transmission. The design principles of energy-efficient ASICs will be illustrated through these two design examples. The technique trends in this specific area will also be briefly discussed in this tutorial.

Saturday, December 14 2:30 - 3:00 (Asia/Qatar)

CB1: Coffee Break

Saturday, December 14 3:00 - 5:00 (Asia/Qatar)

Tutorial-4: Intelligent Memory for Efficient AI Hardware Accelerator -

Dr. Baker Mohammad

Tutorial

Room: Al Areen 5 & 6

Chair: Abdallah Kassem

Abstract: Memory architecture and design have been critical for digital systems to achieve ample storage, low latency, fast access time, and energy efficiency, especially for battery-operated devices. The increase of data generated by many devices such as mobile phones, sensors, communications, and security increased the requirements for memory capacity and the challenges of memory access and energy. The memory interface has limited throughput and high latency, which has not been scaling at the same rate as data size or processing speed; this limits the performance of accessing the data, which is referred to as the memory wall. In addition to the negative impact on latency and performance, large data movement results in high energy consumption. Research has focused on elevating the memory wall issue by engineering more memory hierarchy and increasing local on-chip memory. This has partially reduced the timing issue but did not address the high leakage and active energy consumption. It is estimated that over 60% of energy spent on most computing platforms is spent on data movements and memory access.

The new era of big data and artificial intelligence-based applications has increased the urgency to solve memory capacity, data movement energy, and memory wall issues. Some solutions have brought processing into centralized cloud computing, with high performance and large memory hardware capacity available. However, this brought a new challenge to communications, privacy, security, and latency, especially for real-time applications. This tutorial highlights the challenges above and presents a new computing paradigm beyond von Neuman's architecture to enable processing as close to the data source as possible. This includes in-memory computing and near-memory computing architecture. Both existing and emerging memory technologies will be explored. Since the new computing paradigm is more data-centric than processing-centric, the traditional single architecture for all applications is not feasible. Hence, domain-specific architecture and hardware solutions need to be adopted. Popular high computing functions such as Query, MAC, hamming distance, and image compression will be presented as examples of in-memory hardware accelerators.

Saturday, December 14 3:00 - 5:00 (Asia/Qatar)

Tutorial-5: Energy-Efficient ASIC Techniques for Implantable Sensing

Hanjun Jiang

Tutorial

Room: Al Majida

Chair: Bo Wang

Abstract: Implantable sensing is a promising solution to provide continuous monitoring of human body with a bunch of merits, such as direct measurement of vital signals, improved system robustness, anti-interference capability, etc. The highly-integrated and energy-efficient application specific integrated circuits (ASICs) are the key building components to build the miniature implantable sensors. Such ASICs will provide the functions of signal acquisition, processing and transmission. In this tutorial, we will first review the signal acquisition/processing/transmission requirements in such applications, foll0wed by the major considerations of these ASICs. We will then take two practical applications as the examples, namely, the implantable electrocardiogram (ECG) sensor and the intracranial pressure (ICP) sensor, to exhibit the state-of-the-arts ASIC techniques for ultra-low power bio-signal acquisition, near sensor processing, and short-range through-body data transmission. The design principles of energy-efficient ASICs will be illustrated through these two design examples. The technique trends in this specific area will also be briefly discussed in this tutorial.

Saturday, December 14 3:00 - 5:00 (Asia/Qatar)

Tutorial-6: Smart Sensors for Automotive Applications

Drs. Sherif Saleh & Hattan Abutarbush

Tutorial

Room: AL Jazi

Chair: Ahmed Madian

Abstract: Recently, the principle of intelligent sensors has become increasingly popular in the automotive market. Car sensors play a crucial role in ensuring that a vehicle operates safely and efficiently. The time now to take advantage of bus communication, digital signal processing and fault diagnosis. ASIC permits the level of integration needed to control the production costs while allowing libraries of component to be assembled cheaply and easily on a workstation to provide the required flexibility. Sensors are now an essential part of any modern automotive design and serve many different purposes. They play a key role in helping car manufacturers to bring models to the market that are safer, more economical and more comfortable-to-drive. Over time, sensors will also enable greater degrees of vehicle automation, which is benefit to the industry. The next-generation sensors being developed will ultimately determine the desired autonomous driving experience. Through innovating in the areas mentioned in this insight, the cars of tomorrow will provide a clear and constantly updated picture of what is happening, both in relation to the external environment and in relation to what their occupants are doing. Therefore, sensing technologies hold key to the future of the automotive industry. This tutorial will throw light on different types of sensors in a car, which monitor different aspects of a vehicle and send information to the ECU. With the focusing on their functions and their implementation in the system.

Saturday, December 14 5:00 - 6:30 (Asia/Qatar)

Rec [Al Areen (Room 4)]: Conference Cocktail Reception

Al Areen 4 (Room)

Sunday, December 15

Sunday, December 15 8:00 - 8:30 (Asia/Qatar)

VIP-Reception [Al Anood Room]: Guests' Arrivals and Registration

Al Anood

Sunday, December 15 8:30 - 9:00 (Asia/Qatar)

OpCer [Al Areen (Ballroom)]: Opening Ceremony

[Al Areen (Ballroom)]

Sunday, December 15 9:00 - 9:40 (Asia/Qatar)

Panel-1 [Al Areen (Ballroom)]: Panel Discussion

Al Areen (Ballroom)

Sunday, December 15 9:40 - 10:00 (Asia/Qatar)

CB2: Coffee Break

Sunday, December 15 10:00 - 11:00 (Asia/Qatar)

Keynote Speaker-1 [Al Areen (Ballroom)]: Generational Transformations in VLSI Engineering!

Dr. Pradeep Elamanchili (Vice President, Head of Global Custom Silicon/ASIC R&D, Western Digital)

Keynote Speaker

In the context of other major transformation in the world and in Semiconductor industry, we share our vision of how the Generative-AI will transform the VLSI design process of tomorrow and speed up significantly with GenAI 'co-designers'. The talk will cover some of the technologies that Western Digital has implemented internally for autonomous design implementation and how Western Digital leverages the latest in 3D silicon ("skyscrapers") technology for flash storage to prepare us for the Zettabyte storage era starting in 2024.

Sunday, December 15 11:00 - 12:20 (Asia/Qatar)

s11(A): Biomedical Engineering - Bio-Informatique; Digital Circuits

Room: Al Areen 5 & 6

Chairs: Esam Abdel-Raheem (University of Windsor, Canada), Yiming Wang (Southern University of Science and Technology & Prodrive Technologies, China)

Enhanced Deep Learning Model for Superior Multi-Class Classification Performance

Faezeh Mohammadi Aydoghmishi, Esam Abdel-Raheem and Luis Rueda (University of Windsor, Canada)

A Wireless Anesthesia Depth Monitoring System Based on Features Extracted from Frontal EEG

Yue Cao (Tsinghua University, China); Zheng Zhang (Beijing Tsinghua Changgung Hospital, China & Tsinghua University, China); Anqi Liu (Beijing Tsinghua Changgung Hospital, China); Kaisui Zhang (Beijing Neuramatrix Technology Co., Ltd, China); Yi Duan (Beijing Tsinghua Changgung Hospital, China); Milin Zhang (Tsinghua University, China); Zhifeng Gao (Beijing Tsinghua Changgung Hospital, China)

Fusing Superpixel Graph Propagation and Positional Convolutions for Small Object Detection in Computed Tomography Scan

Sudipta Modak, Esam Abdel-Raheem and Luis Rueda (University of Windsor, Canada)

A Low-Power ABR Characteristic Waveform Automatic Detection Algorithm Design and FPGA Implementation

Fei You (Tsinghua University, China); Manlin Lu (Beijing Tsinghua Changgung Hospital, China); Yahao Song (Tsinghua University, China); Jingwen Zhang, Sichao Liang and Wenjing Chen (Beijing Tsinghua Changgung Hospital, China); Milin Zhang (Tsinghua University, China); Xin Li (Beijing Tsinghua Changgung Hospital, China)

S11(B): Special Session: IoT Hardware Intrinsic Attacks

Room: Al Majida

Chairs: Christos Dimas (National Technical University of Athens, Greece & Phoenix Contact, Germany), Ambika Prasad Shah (Indian Institute of Technology Jammu, India)

Apply Balancing Technique Utilizing Standard Cells Decoupling Caps to Mitigate Side-Channel Attacks

Muhammad Aly Ewais, Sr (Ain Shams University, Egypt & Analog Devices, Egypt); Ahmed Shalaby (Benha University & Egypt-Japan University for Science and Technology, Egypt); M. Watheq El-Kharashi (Ain Shams University, Egypt)

AI-Driven Energy Optimization: Household Power Consumption Prediction with LSTM Networks and PyTorch-Ray Tune in Smart IoT Systems

Vinoth Kumar Kolluru (Stevens Institute of Technology, USA); Yagnesh Challagundla (University of Florida, USA); Advaitha Naidu Chintakunta (University of North Carolina, USA); Bappadittya Roy (VIT-AP University, Amaravati, India); Renuka Devi Sinduval Mallesh (Jawaharlal Nehru Technological University Hyderabad, India); Amin Bermak (Hamad Bin Khalifa University, Qatar)

Enhancing Hardware Trojan Detection: A Dual-Path CNN Approach to Side-Channel Analysis

Arash Golabi, Abdelkarim Erradi, Ahmed Ben Saïd, Abdulla K Al-Ali and Uvais Qidwai (Qatar University, Qatar)

[ART]: a Novel Approach to Automated UVM Test Bench Generation

Abdelaziz Mohammad and Sohila Akram (Siemens DISW, Egypt); Abdelrahman Sabry, Aya Reda, Abdelrahman Kamel and Abdallah Taha (Cairo University, Egypt); Mahmoud Abd El Mawgoed, Eman M. ElMandouh, Samer El Saadany and Waleed Aly (Siemens DISW, Egypt); Omar Nasr (Cairo University, Egypt)

Sunday, December 15 12:20 - 1:30 (Asia/Qatar)

LB1: Lunch Break

Al Areen 4 (Room)

Sunday, December 15 1:30 - 2:30 (Asia/Qatar)

Keynote Speaker-2 [Al Areen (Ballroom)]: Advancing Monitoring Capabilities: The Role of Wearable Sensors in Advancing Healthcare, Environmental, and Marine Studies

Dr. Khaled Nabil Salama (Professor of electrical and computer engineering)

Keynote Speaker

Abstract: This seminar examines the transformative impact of wearable sensor technologies across healthcare, environmental monitoring, and marine biology. In healthcare, these sensors enable continuous monitoring for enhanced patient care and disease management. Environmental applications range from real-time pollution monitoring to ecosystem management, while in marine biology, wearable sensors facilitate non-invasive studies of aquatic life. The discussion will highlight technological advancements in sensor miniaturization and energy efficiency, emphasizing the critical role of interdisciplinary collaboration in optimizing wearable technologies for diverse applications.

Sunday, December 15 2:30 - 3:50 (Asia/Qatar)

S12(A): Biomedical Engineering - Bio-Informatique; Analogue Circuits

Room: Al Areen 5 & 6

Chairs: Vassilis Alimisis (National Technical University of Athens, Greece), Moustafa Nawito (IU Internationale Hochschule, Germany)

A Low-Power Analog Integrated Artificial Neural Networks for Electrical Impedance Tomography Stroke Classification

Vassilis Alimisis (National Technical University of Athens, Greece); Christos Dimas (National Technical University of Athens, Greece & Phoenix Contact, Germany); Andreas Papathanasiou and Savvas Leventikidis (National Technical University of Athens, Greece); Paul Peter Sotiriadis (Johns Hopkins University EPP & Sotecko Electronics LLC, USA)

60µW High Precision Fully Integrated In-Vivo Impedance Spectroscopy Using Synchronous Detection of Magnitude and Phase

Moustafa Nawito (IU Internationale Hochschule, Germany)

A MEMS-Based Sensor System Towards Combined Magnetic Field and Movement Detection

Sebastian Simmich (University of Kiel, Germany); Luis Berndt (Networked Electronic Systems, Germany); Robert Rieger (University of Kiel, Germany)

28nm CMOS Technology-Based Ultra-Compact Tunable IR-UWB Transmitter for Neural Implants: Compliance with FCC, ECC, and Japanese Spectral Masks Under IEEE 802.15.6

Esmaeil R Ranjbar Koleibi (Université de Sherbrooke, Canada); Reza Bostani (Laval University, Canada); Konin C. Koua, Gabriel Lessard and Richard B. Nti (Université de Sherbrooke, Canada); Frederic Nabki (Université du Québec à Montréal, Canada); Sebastien Roy (University of Sherbrooke, Canada); Benoit Gosselin (Laval University & Smart Biomedical Microsystems Lab, Canada); Réjean Fontaine (Université de Sherbrooke, Canada)

Sunday, December 15 2:30 - 3:50 (Asia/Qatar)

S12(B): ANN/AI/ML/DL in Biomedical Engineering - Bio-Informatique

Room: Al Majida

Chairs: Fakhreddine Ghaffari (ETIS CNRS CY Cergy Paris Université ENSEA, France), Tales Cleber Pimenta (Universidade Federal de Itajuba, Brazil)

Efficient Hardware Implementation of Seizure Detector Using Machine Learning

Mariam K. El-Tanbadawy (German University in Cairo, Egypt); Mohammed A.-Megeed Salem (German University in Cairo & Ain Shams University, Egypt); Mohamed Abd El Ghany (German University in Cairo & TU Darmstadt, Egypt)

Enhancing Deep Learning-Based Epileptic Seizure Detection with Generative AI Techniques

Hamza Bouallagui (CY Cergy Paris Université, France); Hamza Chniter (CY Cergy Paris University, France); Fakhreddine Ghaffari (ETIS CNRS CY Cergy Paris Université ENSEA, France); Olivier Romain (Universite Cergy-Pontoise, France)

Improving the Effectiveness of Electric Vehicle Charging Infrastructure Within a Smart City Using Artificial Neural Networks (ANN) and the Internet of Vehicles (IoV)

Youness Hakam (Sultan Moulay Slimane University Beni Mellal, Morocco); Mohamed Tabaa (EMSI Casablanca, Morocco); Ahmed Gaga (Polydisciplinary Faculty (FPBM), Sultan Moulay Slimane University (USMS), Beni-Mellal, Morocco); Benachir Elhadadi (Research Laboratory in Physics and Sciences for Engineers (LRPSI), Morocco); Hajar Ahessab (Moulay Sultan Slimane University, Polydisciplinary Faculty, Beni Mellal, Morocco)

A Six-Day Journey into EMG Signal Analysis Using Prompts

Tales Cleber Pimenta (Universidade Federal de Itajuba, Brazil); Gabriel Cirac (Centro Universitário de Itajubá - FEPI, Brazil)

Sunday, December 15 3:50 - 4:30 (Asia/Qatar)

CB3: Coffee Break

Sunday, December 15 4:30 - 5:50 (Asia/Qatar)

S13(A): Hardware Accelerator-Approximate Computing

Room: Al Areen 5 & 6

Chairs: Mourad Loulou (National School of Engineering of Sfax, Tunisia), Ahmed Radwan (Nile University, Egypt)

Hardware Accelerator for Bidirectional Encoder Representations from Transformers (BERT)

Yiming Wang (Southern University of Science and Technology & Prodrive Technologies, China)

Arithmetic Calculus Modeling for Approximate Circuits

Alain Aoun (Concordia University, Canada); Mahmoud Saleh Masadeh (Hijjawi Faculty for Engineering, Yarmouk University, Irbid, Jordan); Osman Hasan (National University of Sciences and Technology, Pakistan); Sofiene Tahar (Concordia University, Canada)

Energy-Efficient Approximate Squaring Unit

Mahmoud Saleh Masadeh (Hijjawi Faculty for Engineering, Yarmouk University, Irbid, Jordan); Alain Aoun and Sofiene Tahar (Concordia University, Canada)

Deep CNN and Adaptive Habitat Biogeography Based Optimizer Algorithms for Rotating Machine Fault Detection and Classification

Issam Attoui (CRTI, Algeria); Nadir Fergani (Research Center in Industrial Technologies CRTI, Algeria)

S13(B): Time Efficiency, Process Models, Design optimization

Room: Al Majida

Chairs: Saddam Husain (Nazarbayev University, Kazakhstan), Ahmed Madian (Nile University, Egypt)

Improving BPMN XOR Gateway Labels Through Dynamic Prompt Engineering

Sarah Ayad and Fatimah Alsayoud (Arab Open University, Saudi Arabia)

Query-Based Topic Modeling and Trend Analysis in Scientific Literature

Ahmed Tarek (German University in Cairo, Egypt); Marwa Mahmoud Abla (German University in Cairo (GUC), Egypt); Basma Afifi and Maggie Mashaly (German University in Cairo, Egypt); Mervat Abu-Elkheir (The German University in Cairo & Faculty of Media Engineering and Technology, Egypt)

An Open-Source Tool for Analyzing the Time Efficiency of Machine Learning on Edge Devices

Heba Khdr (Karlsruhe Institute of Technology, Germany); Yigit Oguz (Karlsruhe Institute of Technology (KIT), Germany); Joerg Henkel (KIT, Germany)

Cyclic Memory: an Efficient Alternative to Ping-Pong Buffer for FMCW LIDAR Interleaving/de-Interleaving

Omar S Hafez, Omar Ashraf Abouelfetouh, Youssef O. Mohamed and Mohamed Niazy Hassaneen, Jr (Cairo University, Egypt); Omar Hamdy Fathy (Egypt); Yasmine H Hassan (Cairo University, Egypt); Rawan Adel Elomda (The American University in Egypt, Egypt); Mohsen Mahroos and Mostafa Ghouneem (Cairo University, Egypt)

Monday, December 16

Monday, December 16 8:30 - 9:30 (Asia/Qatar)

Keynote Speaker-3 [Al Areen (Ballroom)]: Advances in High-Power Module Packaging for Electric Vehicles

Dr. Achim Strass, Nexperia Head of Technology Scouting and Cooperation

Al Areen (Ballroom)

Abstract: Power modules are pivotal in electric vehicles, where packaging impacts performance, reliability, and lifespan. Wide bandgap (WBG) semiconductors like Silicon Carbide (SiC) and Gallium Nitride (GaN) enable higher temperatures, frequencies, and efficiencies compared to silicon. Recent innovations, including molded modules and double-sided cooling, enhance flexibility and thermal performance. Robust topside interconnections and advanced die-attach technologies like copper sintering address the increasingly challenging high-power demands. Embedding semiconductor devices into printed circuit boards (PCBs) reduces size and improves efficiency by minimizing resistance and inductance.

Monday, December 16 9:30 - 10:50 (Asia/Qatar)

S21(A): Chaos Theory and Complex Hardware/Software Systems

Room: Al Areen 5 & 6

Chairs: Abdallah Kassem (Notre Dame University, Lebanon), Sofiene Tahar (Concordia University, Canada)

Pseudo-Random Number Generator Based on Neural Network and Chaos

Anas Mohamed Salah, Lobna Said and Ahmed Radwan (Nile University, Egypt)

5G-Channel Estimation Kernels on RISC-V Vector Digital Signal Processors

Javier Acevedo (Technical Univierstiy of Dresden, Germany); Frank H.P. Fitzek (Technische Universität Dresden & ComNets - Communication Networks Group, Germany); Patrick Seeling (Central Michigan University, USA)

First Layer Optimization of Convolutional Neural Networks for IoT Edge Devices

Sajna Tasneem Shoukath Ali, Abubakar Abubakar, Arshad Khan and Amin Bermak (Hamad Bin Khalifa University, Qatar)

Structure Optimization for Soft Fluidic Fish Tail

Mahmoud Tarek Aboelrayat (Nile University, Egypt); Yahia Amr AboZaid (Nile University, Egypt & Al-Azhar University, Egypt); Irene Fahim, Ahmed Abo bakr, Lobna Said and Ahmed Radwan (Nile University, Egypt)

S21(B): ADC-LDO-PLL

Room: Al Majida

Chairs: Ambika Prasad Shah (Indian Institute of Technology Jammu, India), Mustafa Berke Yelten (Istanbul Technical University, Turkey)

A Low Power ΔΣ Modulator with Low Voltage OTA for Wearable Applications

Naoya Maruyama and Satoshi Komatsu (Department of Electronic Engineering Graduate School of Engineering Tokyo Denki University, Tokyo, Japan)

An 8-Bit Fractional-Order Sigma-Delta Modulator Based on Unity STF Architecture

Ahmed Magdy, Bo Wang and Amin Bermak (Hamad Bin Khalifa University, Qatar)

A Fast-Transient Capacitorless LDO with Slew Rate Enhancement and Fast Power-On Startup Path

Hua Fan (University of Electronic Science and Technology of China, China)

A 6 GHz RO PLL with -285 dB FOMJitter-N-Area, 130fs RMS Jitter and 0.0016 mm2 Area

Markus Dietl (Technical University of Munich, Germany); David Bachmayer and Ralf Brederlow (Technical University Munich, Germany)

Monday, December 16 10:50 - 11:10 (Asia/Qatar)

CB4: Coffee Break

Monday, December 16 11:10 - 12:30 (Asia/Qatar)

S22(A): Cyber-physical-Hardware Systems Security

Room: Al Areen 5 & 6

Chairs: Hua Fan (University of Electronic Science and Technology of China, China), Bappadittya Roy (VIT-AP University, Amaravati, India)

Configurable RO-PUF with Improved Thermal Stability for Lightweight Applications

Aarushi Gupta (Dr BR Ambedkar National Institute of Technology Jalandhar, India); Syed Farah Naz and Ambika Prasad Shah (Indian Institute of Technology Jammu, India)

Client-Server Framework for FPGA Acceleration of Fan-Vercauteren-Based Homomorphic Encryption

Simon Bothe (KIT, Germany); Hassan Nassar (Karlsruhe Institute of Technology, Germany); Lars Bauer (Germany); Joerg Henkel (KIT, Germany)

FPGA Realization of a Security System for Internet of Multimedia Things

Remas Osama Metwaly and Eyad Mamdouh Ayad (German University in Cairo, Egypt); Wassim Alexan (GUC, Egypt); Mohamed Abd El Ghany (German University in Cairo & TU Darmstadt, Egypt)

Fredkin Gate-Based Feed-Forward Arbiter PUF Design on FPGA

Chinni Prabhunath G and Ambika Prasad Shah (Indian Institute of Technology Jammu, India)

Monday, December 16 11:10 - 12:30 (Asia/Qatar)

S22(B): Analog and RF Circuit Design Techniques-I

Room: Al Majida

Chairs: Sohila Akram (Siemens DISW, Egypt), Mostafa Katebi (Iran University of Science & Technology & Westlake University, China)

Realization of PVT Independent Current-Mode CMOS Exponential Circuit

Mazen Mohamed Abouelezz (King Fahd University of Petroleum and Minerals, Saudi Arabia); Muneer Ahmed Al-Absi (King Fahd University of Petroleum & Minerals, Saudi Arabia & IRC for Communication Systesm and Sensing, Saudi Arabia)

A High Dynamic Range CMOS Peak Detector Circuit for Feedforward Automatic Gain Control Systems

Ali Doğuş Güngördü, İrem Cömertoğlu and Mustafa Berke Yelten (Istanbul Technical University, Turkey)

A Novel Approach for Achieving FOMs in Space Constrained Optimized Arrays for AESA Applications

Shawkat Ali, Arshad Hassan, Amin Bermak and Arshad Khan (Hamad Bin Khalifa University, Qatar); Ghiayas Tahir (National University of Computer and Emerging Sciences, Pakistan); Athar Naveed (NASTP Electronics System Design Center, Pakistan)

A High-Linearity Constant-Bandwidth PVT-Tolerant 10 Gbps PAM-4 Inverter-Based Compact VGA

Halil Kırğıl, Ali Doğuş Güngördü, İrem Cömertoğlu and Mustafa Berke Yelten (Istanbul Technical University, Turkey)

Monday, December 16 12:30 - 1:30 (Asia/Qatar)

LB2: Lunch Break

Al Areen 4 (Room)

Monday, December 16 1:30 - 2:30 (Asia/Qatar)

Keynote Speaker-4 [Al Areen (Ballroom)]: Neuromorphic Techniques for an Intelligent Vision System

Dr. Kea-Tiong (Samuel) Tang, Professor, National Tsing Hua University, Hsinchu, Taiwan

Al Areen (Ballroom)

Abstract: Massive computation, data, and power consumption limits the deployment of artificial intelligence on edge devices. Key technologies based on neuromorphic computing provide solutions to edge computing, which is essential to develop the next generation AI chip. In this talk, neuromorphic techniques including model, architecture, and sensing will be discussed. These techniques will be demonstrated on a microdrone platform for the task of obstacle avoidance.

Monday, December 16 2:30 - 3:50 (Asia/Qatar)

S23(A): AI/IoT/ML/MDL Systems

Room: Al Areen 5 & 6

Chair: Amine Miled (Laval University, Canada)

Powering a Six-Axis Robotic Arm with AI to Collect Plastic Bottles

Mohamed zied Chaari (Qatar University, Qatar); Gilroy Philbert Pereira (Qatar Scientific Club, Qatar)

Optimizing Industrial System from Machine Learning to Digital Twin-Driven Predictive Maintenance

Fatima-ezzahra Labchiri (EMSI, Morocco); Zineb Hidila (Lpri Emsi, Morocco); Ayoub Fentis (EMSI, Morocco); Fabrice Monteiro (LGIPM, Université de Lorraine, France); Abdoul Rjoub (Jordan University of Science and Technology, Jordan); Amana Abdennasser (Mundiapolis Casablanca Morocco, Morocco)

Federated Learning for Robust People Detection in Decentralized Surveillance Systems

Saif Ismael (German University in Cairo, Egypt); Mohammed A.-Megeed Salem (German University in Cairo & Ain Shams University, Egypt); Dinah Waref (German University in Cairo, Egypt)

AI-Capable Computational CMOS Image Sensors: from Concept to Trend

Abubakar Abubakar, Bo Wang and Amin Bermak (Hamad Bin Khalifa University, Qatar)

Monday, December 16 2:30 - 3:50 (Asia/Qatar)

S23(B): Analog and RF Circuit Design Techniques-II

Room: Al Majida

Chairs: Christos Dimas (National Technical University of Athens, Greece & Phoenix Contact, Germany), Bo Wang (Hamad Bin Khalifa University, Qatar)

An Analog Integrated Relu-Based Neural Networks for Water Quality Classification

Vassilis Alimisis (National Technical University of Athens, Greece); Christos Dimas (National Technical University of Athens, Greece & Phoenix Contact, Germany); Andreas Papathanasiou (National Technical University of Athens, Greece); Paul Peter Sotiriadis (Johns Hopkins University EPP & Sotecko Electronics LLC, USA)

Insights Offered by Periodic Nonlinearity Noise into Nonlinearity-Induced Fractional Spurs

Michael Peter Kennedy and Xu Lu (University College Dublin, Ireland)

A High Area and Current Efficient Charge Pump Design

Ankit Rehani, Chaitanya G and Pradeep Anantula (Western Digital, India)

A Power-Efficient, Analog Integrated, Sigmoid-Based Edge Detector

Vassilis Alimisis (National Technical University of Athens, Greece); Christos Dimas (National Technical University of Athens, Greece & Phoenix Contact, Germany); Paul Peter Sotiriadis (Johns Hopkins University EPP & Sotecko Electronics LLC, USA)

Monday, December 16 3:50 - 4:30 (Asia/Qatar)

CB5: Coffee Break

Monday, December 16 4:30 - 5:50 (Asia/Qatar)

S24(A): Digital Systems

Room: Al Areen 5 & 6

Chairs: Abdallah Kassem (Notre Dame University, Lebanon), Ahmed Madian (Nile University, Egypt)

Temperature-Resilient Ring Oscillator Design: Achieving Frequency Stability Across Voltage Domains

Divin Dominic (IIIT Delhi, India); Anuja Goyal (National Institute of Technology, Karnataka, India); Anuj Grover (IIIT Delhi, India)

A Glitch Tolerant Flip-Flop Architecture for Low Frequency and Low Power IoT Applications

Anuj Bhardwaj (STMicroelectronics, India)

Proposal and Validation of a Dual Scalable Annealing Processing System That Simultaneously Scales Capacity and Precision

Dong Cui, Taichi Megumi, Akari Endo and Takayuki Kawahara (Tokyo University of Science, Japan)

A Design of Rechargeable In-Circuit Serial Programmer for Industrial Embedded Systems

Ahmed I. Ahmed (Nile University, Egypt & Fares PCB for Electronic Solutions, Egypt); Bishoy K Sharobim, Marwan Ahmed Fetteha and Lobna Said (Nile University, Egypt); Ahmed M. Eltawil (King Abdullah University of Science and Technology, Saudi Arabia); Ahmed Madian (Nile University, Egypt)

Monday, December 16 4:30 - 5:50 (Asia/Qatar)

S24(B): BioSensor, Magnetic, and Smart sensors and sensor networks.

Room: Al Majida

Chairs: Vassilis Alimisis (National Technical University of Athens, Greece), Bappadittya Roy (VIT-AP University, Amaravati, India)

Printed RF Contact CPW Sensor for Liquid Detection and Sensing

Arshad Hassan, Shawkat Ali, Arshad Khan and Amin Bermak (Hamad Bin Khalifa University, Qatar)

Plasmonic Waveguide with Spoof Localized Plasmon Polariton Based Resonator for Biosensing Applications

Imam Vali Shaik (SRM University AP Andra Pradesh, India); Sreenivasulu Tupakula (SRM University AP Andhrapradesh, India); Shaik Rajak (Amrita Vishwa Vidyapeetham, India)

Design of a PPG-Based Respiratory Sensor

Yuhui Du (Tsinghua University, China); Chao Sun (Beijing Ningju Technology Co., Ltd, China); Yuan Ma (Tsinghua University, China); Shuan Liu (Beijing Ningju Technology Co., Ltd, China); Milin Zhang (Tsinghua University, China)

Toward Green and Flexible Human-Machine Interfaces: Personalized DIY Paper-Based Capacitive Macro Touchpads

Muhammad Mateen Fawad (Information Technology University, Pakistan); Kashif Riaz (Information Technology University, Pakistan & Hamad Bin Khalifa University, Qatar); Muhammad Hamza Zulfiqar and Muhammad Nasir (Information Technology University, Pakistan); Arshad Khan (Hamad Bin Khalifa University, Qatar); Abdelkrim Khelif (Hamad Bin Khalifa University, Doha, Qatar)

Monday, December 16 7:00 - 9:00 (Asia/Qatar)

Gala: Dinner

Tuesday, December 17

Tuesday, December 17 8:30 - 9:10 (Asia/Qatar)

Keynote Speaker-5 [Al Areen (Ballroom)]: Mihai Sanduleanu (Associate Professor at Khalifa University of Science and Technology)

Medical devices at mm-Waves: Vital Signs Monitoring and Non-Invasive Glucometer. Past, present and future

Al Areen (Ballroom)

Abstract: The talk concerns medical devices like Vital Signs Monitoring and Glucometers. After a short presentation of the past and present methods (wired or invasive) we will discuss future solutions that are wireless and non-invasive. The advantage of seeking future solutions at mm and sub-mm Waves is manifold. First, the available bandwidth is higher at those frequencies, and we can get a better range resolution and velocity resolution for Vital signs monitoring. This then allows us to get heart signal with clear P, Q, R, S, T waves and ECG resolution. By this we could replace the 12 wire existing solutions with a wireless ECG. Moreover, at mm-Waves frequencies we could integrate the antennas on chip eliminating bond-wire connections to the antennas. For non-invasive glucose level detection, going to mm-Wave frequencies allows a compact solution with small footprint.

Tuesday, December 17 9:10 - 10:30 (Asia/Qatar)

S31(A): Communication-Antenas Systems

Room: Al Areen 5 & 6

Chair: Ali Safa (Hamad Bin Khalifa University, Belgium)

High Performance Wideband 0.25 Um GaAs Bi-Directional Low Noise Amplifier Design

Metehan Öztürk (ASELSAN Inc., Turkey); Adnan Gündel (ARFEL Chip Solutions, Turkey); Mustafa Berke Yelten (Istanbul Technical University, Turkey)

Toward Using Monostatic Antennas with near-Field Cancellation Technique in IBFD Phased Arrays

Hanan Ouled Ongoura (Lab-STICC, University of Brest, France); Hadi Hijazi (Lab-STICC/ENSTA Bretagne, France); Benewende Yves Ulrich Simpore (Lab-STICC, University of Brest, France); Marc Le Roy (Lab-STICC, France); Jean-Thierry Kubwimana (Lab-STICC, University of Brest, France); Raafat Lababidi (Ensta Bretagne, France); Roland Gautier (University of Brest, France); Andre Perennec (Lab-STICC, France); Gérard Tanné (Lab-STICC - Université de Bretagne Occidentale, France); Stéphane Mallegol (THALES Systèmes Aéroportés, France)

A 18.06 Ppm/oC Fully CMOS Bandgap Voltage Reference: Experimental Results

Mostafa Katebi (Iran University of Science & Technology & Westlake University, China); Abbas Erfanian and Mohammad Azim Karami (Iran University of Science and Technology, Iran); Mohamad Sawan (Westlake University, China)

Automating the Design of Multi-Band Microstrip Antennas via Uniform Cross-Entropy Optimization

Ali Al-Zawqari (Vrije Universiteit Brussel, Belgium); Ali Safa (Hamad Bin Khalifa University, Belgium); Gerd Vandersteen (Vrije Universiteit Brussel (VUB), Belgium)

Tuesday, December 17 9:10 - 10:30 (Asia/Qatar)

S31(B): AI/ML/MDL System

Room: Al Majida

Chair: Saddam Husain (Nazarbayev University, Kazakhstan)

Pilot Overhead Reduction in 5G mmWave m-MIMO Systems Using Unsupervised and Supervised AI

Mohammad R Abou Yassin and Soubhi Abou Chahine (Beirut Arab University, Lebanon); Hamza Issa (American University of the Middle East, Kuwait)

Quality-Aware Node Selection for Efficient Federated Learning Based on a Global Perspective

Nawraz Mohamed Shaat (German University in Cairo, Egypt); Mohamed Ashour (German International University in Berlin, Egypt); Maggie Mashaly (German University in Cairo, Egypt)

An 8T Single Bit-Line Content Addressable Memory Cell for High-Performance Searching Applications

Arnav Banerjee and Sheikh Wasmir Hussain (Indian Institute of Information Technology Guwahati, India)

Intelligent NAND Flash Memory for In-Situ Block Health Prediction with Machine Learning

Xuan Tian, Liang Li, Sixiang Zhao, Weitian Wang, Phoebe Fu and Ming Wang (Western Digital, China)

Tuesday, December 17 10:30 - 11:10 (Asia/Qatar)

CB6: Coffee Break

Tuesday, December 17 11:10 - 12:30 (Asia/Qatar)

S32(A): FPGA Applications

Room: Al Areen 5 & 6

Chairs: Sajad A. Loan (Jamia Millia Islamia, New Delhi, India), Ali Safa (Hamad Bin Khalifa University, Belgium)

Optimized Fixed Point MAC Unit for Neural Network on FPGA

Farshideh Kordi (Laval University, Canada); Paul Fortier (Laval, Canada); Amine Miled (Laval University, Canada)

An FPGA-Based RISC-V Instruction Set Extension and Memory Controller for Multi-Level Cell NVM

Mina Ibrahim (KIT, Germany); Martel M. Shokry (Karlsruhe Institute of Technology, Germany & German University in Cairo, Egypt); Lokesh Siddhu (KIT, Germany); Lars Bauer (Germany); Hassan Nassar (Karlsruhe Institute of Technology, Germany); Joerg Henkel (KIT, Germany)

A Masked Face Detector Using Configurable Accelerator Based on Tiny DarkNet for FPGA Prototyping

Arwa Abd El-Ghany (Cairo University, Egypt & Siemens Company, Egypt); Ahmed Khalil and Ibrahim Qamar (Cairo University, Egypt); Hassan Mostafa (University of Toronto, Canada)

Fault-Tolerant FPGA-Based System for Mitigating SEUs in Configuration and User Bits

Omar Tarek Amer (Cairo University, Egypt); Gehad Ismail Alkady (German International University (GIU), Egypt); Fekry Y. Mohamed and Abdallah W. Mahmoud (American University in Cairo, Egypt); Hassanein H. Amer (American University in Cairo (AUC), Egypt); Ramez M Daoud (American University in Cairo & KAMA Engineering Office, Egypt)

Tuesday, December 17 11:10 - 12:30 (Asia/Qatar)

S32(B): Semi-Conductor Systems

Room: Al Majida

Chairs: Abdelkrim Khelif (Hamad Bin Khalifa University, Doha, Qatar), Xuan Tian (Western Digital, China)

Design of Average Current Mode Controller for Boost LED Drivers

Victor Dawood (Princess Sumaya University for Technology, Jordan); Ibrahim Abuishmais (Princess Sumaya University for Technology (PSUT), Jordan); Fadi R. Shahroury, Emad El-Shaham and Zaina Al-Khalidi (Princess Sumaya University for Technology, Jordan)

Ensemble Learning-Based Small-Signal Intrinsic Parameter Extraction Model for GaN HEMTs

Ahmad Khusro (Nazarbayev University, Astana, Kazakhstan); Saddam Husain and Mohammad Hashmi (Nazarbayev University, Kazakhstan)

Development and Assessment of ML Based GaN HEMTs Small-Signal Modelling Techniques

Kashif Khan and Saddam Husain (Nazarbayev University, Kazakhstan); Anwar Hasan Jarndal (United Arab Emirates & University of Sharjah, United Arab Emirates); Mohammad Hashmi (Nazarbayev University, Kazakhstan)

Mid-Infrared Wavelength-Selective Absorbing Metasurfaces Based on Highly-Doped Silicon Gratings

Kirollos Ernest Matta and Sreyash Sarkar (ESYCOM Lab, UMR 9007 CNRS, Univ Gustave Eiffel, 77454 Marne-la-Vallée, France.); Ahmed Elsayed (Ain-Shams University, Faculty of Engineering, 1 Elsarayat St. Abbassia, Cairo, Egypt.); Frédéric Marty and Armande Hervé (ESYCOM Lab, UMR 9007 CNRS, Univ Gustave Eiffel, 77454 Marne-la-Vallée, France.); Mazen Erfan (Si-Ware Systems, 3 Khalid Ibn Al-Waleed St., Heliopolis, Cairo, Egypt.); Diaa Khalil and Yasser Sabry (Ain-Shams University, Faculty of Engineering, 1 Elsarayat St. Abbassia, Cairo, Egypt.); Elyes Nefzaoui and Tarik Bourouina (ESYCOM Lab, UMR 9007 CNRS, Univ Gustave Eiffel, 77454 Marne-la-Vallée, France.)

Tuesday, December 17 12:30 - 1:30 (Asia/Qatar)

LB-3: Lunch Break

Al Areen 4 Room

Tuesday, December 17 1:30 - 2:50 (Asia/Qatar)

S33(A): Energy Efficient Computing Based on Emerging Technologies

Room: Al Areen 5 & 6

Chairs: Abubakar Abubakar (Hamad Bin Khalifa University, Qatar), Christos Dimas (National Technical University of Athens, Greece & Phoenix Contact, Germany)

Design & Implementation of a Hybrid Multiplexer Leveraging Memristor and CNTFETs

Syed Ali Hussain (SRM University AP, India); P N S B S VPrasad V (SRM University-AP, India); Pradyut Kumar Sanki (SRM University AP, India)

Machine Learning Based Memory Load Value Predictor for Multimedia Applications

Alain Aoun (Concordia University, Canada); Mahmoud Saleh Masadeh (Hijjawi Faculty for Engineering, Yarmouk University, Irbid, Jordan); Sofiene Tahar (Concordia University, Canada)

Proposed Two Ternary Decoders Using CNTFET

Ramzi A. Jaber (Lebanese University, Lebanon); Hiba S Bazzi (Beirut Arab University, Lebanon); Abdallah Kassem (Notre Dame University, Lebanon); Ali Massoud Haidar (Beirut Arab University, Lebanon)

A Configurable CMOS Delay Element for Spiking Neural Networks

Dan Lawrence (Kiel University, Germany); Bharath Kumar Singh Muralidhar and Robert Rieger (University of Kiel, Germany)

Tuesday, December 17 1:30 - 2:50 (Asia/Qatar)

S33(B): Power Systems Technologies and Agriculture

Room: Al Majida

Chair: Mohamed Tabaa (EMSI Casablanca, Morocco)

Efficient Single-Phase EV Charging System Using Flyback and Buck Converters with MPC for Lithium-Ion Battery Cells

Youness Hakam (Sultan Moulay Slimane University Beni Mellal, Morocco); Mohamed Tabaa (EMSI Casablanca, Morocco); Ahmed Gaga (Polydisciplinary Faculty (FPBM), Sultan Moulay Slimane University (USMS), Beni-Mellal, Morocco); Hajar Ahessab (Moulay Sultan Slimane University, Polydisciplinary Faculty, Beni Mellal, Morocco); Benachir Elhadadi (Research Laboratory in Physics and Sciences for Engineers (LRPSI), Morocco)

Voltage Stability Enhancement in Lebanese Islanded Hybrid Microgrid: The Role of Shunt Capacitor Banks and Synchronous Generator Droop Control

Ali Koubayssi (LIU & BIU, Lebanon); Mohamad Arnaout (College of Engineering and Technology, American University of the Middle East, Kuwait)

Edge Computing Based Early Yellow Rust Disease Detection in Wheat Plants

Ali Ahsan, Muhammad Sajid Iqbal and Muzammil Ahmar (National University of Computer and Emerging Sciences, Pakistan); Muhammad Adnan (FAST National University of Computer and Emerging Sciences, Pakistan); Muhammad Ali Akbar and Amin Bermak (Hamad Bin Khalifa University, Qatar)

A New Four-Stage Self-Cascode Charge Pump for Efficient and High-Voltage Stimulation

Mostafa Katebi (Iran University of Science & Technology & Westlake University, China); Abbas Erfanian and Mohammad Azim Karami (Iran University of Science and Technology, Iran); Mohamad Sawan (Westlake University, China)

Tuesday, December 17 2:50 - 3:50 (Asia/Qatar)

S34(A): General circuits-I

Room: Al Areen 5 & 6

Chairs: Abdallah Kassem (Notre Dame University, Lebanon), Bo Wang (Hamad Bin Khalifa University, Qatar)

Design of a 16-QAM 96 Mbps Transceiver in 400MHz for Medical Applications

Zhuojun Yu (Tsinghua University, China); Xiliang Liu (Beijing Ningju Technology Ltd, China); Milin Zhang (Tsinghua University, China)

Design and Characterization of a Configurable Current Conveyor Circuit

Ahmed Reda Mohamed (Fahd University of Petroleum and Minerals, Saudi Arabia & Interdisciplinary Research Center for Communications Systems and Sensing, Saudi Arabia); Muneer Ahmed Al-Absi (King Fahd University of Petroleum & Minerals, Saudi Arabia & IRC for Communication Systesm and Sensing, Saudi Arabia)

Co-Design of a Robot Controller Board and Indoor Positioning System for IoT-Enabled Applications

Ali Safa (Hamad Bin Khalifa University, Belgium); Ali Al-Zawqari (Vrije Universiteit Brussel, Belgium)

Tuesday, December 17 2:50 - 3:50 (Asia/Qatar)

S34(B): General Circuits-II

Room: Al Majida

Chair: Ahmed Madian (Nile University, Egypt)

Design and Implementation of a Configurable Synchronizer for PSI5 Transceivers on FPGA

Haytham Azmi (Electronics Research Institute, Egypt); Ghazal Fahmy (National Telecommunication Institute & Graduate School of Information Science and Electrical Engineering, Egypt); Sherif Saleh (Hahn-Schickard In., Germany & Department of Microsystem and Technology - Faculty of Engineering, Germany)

A Highly Sensitive Magnetic Hall Sensor with a Low Noise Integrated CCIA Interface Circuit

Jiang Xinbo, Kai Qiao, Xuejiao Li and Xinyuan Zhang (Beijing Institute of Technology, China); Bo Wang (Hamad Bin Khalifa University, Qatar); Huikai Xie and Xiaoyi Wang (Beijing Institute of Technology, China)

Partial Ground Plane Junctionless Transistor on Selective Buried Oxide

Mohd Rizwan Uddin Shaikh (Jamia Millia Islamia University, India); Anam Khan (Jamia Miliia Islamia, New Delhi, India); Md. Shiblee (KingKhalid, India); Sajad A. Loan (Jamia Millia Islamia, New Delhi, India)

Tuesday, December 17 3:50 - 4:10 (Asia/Qatar)

CB7: Coffee Break

Tuesday, December 17 4:10 - 4:30 (Asia/Qatar)

CC: Closing Ceremony

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